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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,980	08/06/2001	Diana Xiaobing Ma	005825 USA/ETCH/DRIE	1441

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER	
ROCCHEGIANI, RENZO	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/922,980	MA ET AL.	
	Examiner	Art Unit	
	Renzo N. Rocchegiani	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,14-17,19,20 and 22-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11, 14-17, 19-20 and 22-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-11, 14-17, 19-20 and 22-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants admitted prior art (See figures and specification of pending application) in view of U.S. Patent No. 5,186,718 (Tepman et al.).

Applicant admits that it is well known in the art to perform a process that comprises the sequential steps of patterning a photoresist mask material over a dielectric layer, such as an oxide layer, etching the dielectric layer using fluorocarbons and a the patterned mask down to an etch stop layer, ashing the mask layer, removing the exposed etch stop layer, depositing a barrier layer comprising tantalum in the trench, depositing a copper seed layer wherein either one of the deposition steps are performed via sputtering. (See Fig. 1-5 in application and Background section of Specification).

Applicant points out that the prior art does not teach performing these steps using an apparatus that allows for sub-atmospheric conditions, i.e. vacuum, and wherein the wafer is transferred from one process chamber to the next without breaking the vacuum condition and without exposing the wafer to the atmosphere.

Tepman et al. teach the use of an apparatus that would allow the transfer of a wafer from one chamber to another while maintaining vacuum conditions and thus

without exposing the wafer to the atmosphere, such apparatus being adaptable to any process including but not limited to: chemical etching, deposition, and heat treatment steps. (col. 4, lines 10-30 and col. 5, lines 15-42). Tepman et al. teach that the transfer chambers are equipped with wafer handling robots. (items 40 and 42, and col. 5, lines 42-65). Tepman et al. also teach connecting transfer chambers through load lock chambers that are doubly gated so as to maintain vacuum conditions in the separate transfer chambers during the transfer of the wafer from one transfer chamber to the other. (items 26 and 27, col. 4, lines 55-67). Furthermore, Tepman et al. teach that the first and second transfer chambers may be operated at different vacuum levels, thus one chamber will be maintained at a pressure that is higher or lower than the other chamber. (col. 2, lines 30-35). Because Tepman et al. expressly teaches that the wafer are transferred through the load lock chambers, it inherently implies that these load lock chambers are equipped with a wafer holder that is accessible to the wafer handling robots located in the two transfer chambers, for otherwise the apparatus would not be able to function.

It would have been obvious to one having ordinary skill in the specific art to combine the teachings of Tepman et al. to the prior art teachings admitted by the applicant to arrive at the claimed invention, since as taught by Tepman et al. using such an apparatus would result in a process with less contamination, increase throughput, with minimal pump down time, and a vacuum system with enhanced capability. (See Tepman et al., col. 1, lines 48-67). Furthermore, because the prior art, Tepman et al., teaches that the apparatus is maintained at vacuum conditions (i.e. less than 1

atmosphere), it would have been obvious to one of ordinary skill in the art to use the claimed pressure ranges since it has been held that when there is an overlap in ranges and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. Furthermore, since applicant has admitted to the sequence of steps that are performed to form the device, it would have been obvious to one with ordinary skill in the art to use the apparatus in Tepman et al. to perform the same process steps in the same sequence.

Response to Arguments

3. Applicant's arguments filed on December 18, 2003 have been fully considered but they are not persuasive. Applicant argues that the admitted art from the specification combined with the disclosure by Tepman et al. does not render the claimed invention obvious because the apparatus in Tepman et al. is not designed to perform the steps listed in the claims. The examiner disagrees. Applicant points to chambers 26 and 27 and states that these are "pre-treatment" chambers and thus could not be used to perform the steps recited in the claims. The examiner directs applicant's attention to chambers 44 and 46, also attached to chamber 24, wherein chambers 44 and 46 are not "pre-treatment" chambers. As a matter of fact, Tepman et al. disclose chambers 44 and 46 to be processing chambers. The examiner also points out that the newly added limitation of "sequentially" performing the recited steps only limits the claim by providing a sequence but does not limit the claim from additional steps performed at any time during the process. Thus, because the recited steps are necessary to manufacture

what applicant has admitted is well known in the art to manufacture, it would be obvious for a person with ordinary skill in the art to perform the recited steps in that order. For these reasons applicant's arguments are not persuasive and the newly added claims have been added to the previously presented rejection. The claim objections have been withdrawn thanks to the correcting amendment.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (571) 272-1904. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, Matthew Smith, can be reached at (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

RNR

March 30, 2004

MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800